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## PATENT ABSTRACTS OF JAPAN

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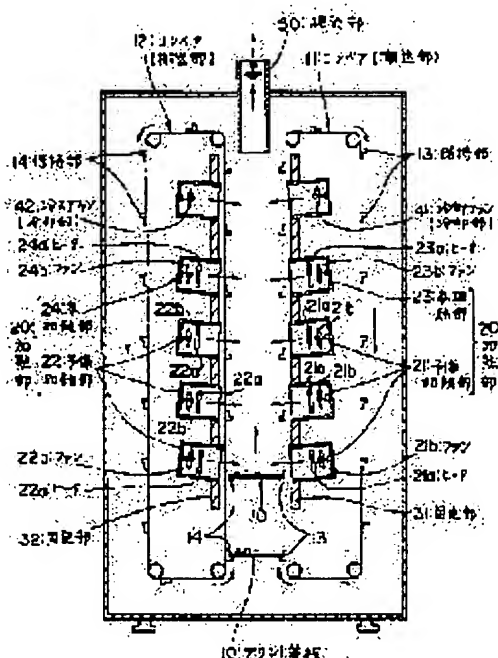
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## (54) VERTICAL REFLOW SOLDERING DEVICE

## (57)Abstract:

PURPOSE: To prevent the defects in mounting and also, make the installation space of a device small by equipping this device with a carrier, which carries a printed board mounting electronic components in vertical direction, and arranging heaters on both sides of the carry path.

CONSTITUTION: A printed board 10 to be soldered by reflow is placed on a holders 13 and 14 positioned at the bottoms of conveyors 11 and 12. And, this printed board 10 is carried vertically by the conveyors 11 and 12, and passes a preheating zone being the carry path of the printed board 10, a regular heating zone, and a cooling zone in order. This way, this takes such a constitution that the printed board is carried vertically and that it is heated from both sides of the carry path by the heater 20, the simultaneous heating of the printed boards 10 becomes possible, and solder paste can be heated and fused at the same time, and the dislocation of the surface mounting components or the mounting defects such as chip erection, etc., can be prevented. Moreover, the lateral width of the device becomes short, and the installation space becomes small.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the vertical mold reflow-soldering equipment which can make the installation tooth space of equipment small while it makes it possible to heat the soldering paste on a printed circuit board to coincidence about reflow-soldering equipment and can prevent poor mounting, such as a location gap of a surface mounted device and chip \*\*\*\*.

[0002]

[Description of the Prior Art] In the field of current and electronic industry, electronic parts are chiefly mounted in a printed circuit board by reflow soldering from the increment in the electronic-parts mark mounted in a printed circuit board, and the need for mass production method. This reflow soldering is the approach of supplying the solder of optimum dose to the junction part of the electronic parts on a printed circuit board beforehand, making carry out melting of the solder according to the heat source from the outside, and soldering electronic parts. And such reflow soldering is performed by reflow-soldering equipment.

[0003] Conventional reflow-soldering equipment had become with the configuration equipped with the conveyor 102 for conveyance which conveys a printed circuit board 101 horizontally as shown in drawing 2, the preheating heater 103 which carries out preheating of the soldering paste on the printed circuit board 101 conveyed by this conveyor 102 for conveyance, this heating heater 104 which has a fan and carries out heating fusion of said soldering paste by hot blast, and the cooling fan 105 which makes said soldering paste which carried out heating fusion cool and solidify.

[0004]

[Problem(s) to be Solved by the Invention] However, since the conventional reflow-soldering equipment mentioned above had become the configuration heated conveying a printed circuit board 101 horizontally, when a printed circuit board 101 moved from preheating to this heating, the temperature gradient arose before [ of a printed circuit board 101 ] the conveyance direction, and in the backside, and it was not able to heat the soldering paste on a printed circuit board to coincidence. For this reason, if shown in the surface mounted device of two electrodes currently laid in the printed circuit board 101, the soldering paste by the side of before [ of a printed circuit board 101 ] the conveyance direction fused previously partially, and there was a problem that said surface mounted device was pulled at this fused soldering paste side, and poor mounting, such as a location gap and chip \*\*\*\*, occurred.

[0005] Moreover, since the above-mentioned conventional reflow-soldering equipment was equipment of the horizontal type which conveys a printed circuit board 101 horizontally, it also had the problem that a large installation tooth space was needed.

[0006] In addition, a printed circuit board and soldering paste are heated to coincidence, and there are some which are shown in the official report of JP,1-118370,A, JP,2-84292,A, JP,2-142676,A, and JP,3-35876,A as reflow-soldering equipment which prevents poor mounting of a surface mounted device. However, each reflow-soldering equipment of these official reports is equipment of a horizontal type, and the problem that an installation tooth space is large is not still solved.

~~[0007] This invention is made in view of the above-mentioned trouble, and it aims at offer of the vertical~~

mold reflow-soldering equipment which made the installation tooth space of equipment small while it heats the soldering paste on a printed circuit board to coincidence and prevents poor mounting, such as a location gap of a surface mounted device and chip \*\*\*\*.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the vertical mold reflow-soldering equipment of this invention The conveyance section which conveys perpendicularly the printed circuit board in which electronic parts were laid through soldering paste, It is arranged at the conveyance way both sides of this conveyance section, and considers as the configuration equipped with the heating unit which carries out heating fusion of the soldering paste on a printed circuit board. Preferably It is arranged so that said conveyance section may counter mutually in the perpendicular condition, and the conveyor driven in this direction and these conveyors are countered, and it is prepared, and has considered as the configuration which consists of an attaching part which holds said printed circuit board among these conveyors. Moreover, it considers as the configuration which said heating unit becomes from the preheating section and this heating unit if needed, and has considered as the configuration which equipped the downstream of said heating unit with the cooling section of a printed circuit board further.

[0009]

[Function] According to the vertical mold reflow-soldering equipment of this invention which consists of the above-mentioned configuration, a printed circuit board is heated by homogeneity from conveyance way both sides by the heating unit while it is perpendicularly conveyed by the conveyance section. Therefore, a temperature gradient does not arise before [ of a printed circuit board ] the conveyance direction, and in the backside, and melting also of the soldering paste on a printed circuit board is carried out to coincidence.

[0010]

[Example] Hereafter, the example of the vertical mold reflow-soldering equipment of this invention is explained, referring to a drawing. Drawing 1 is the transverse-plane sectional view showing the vertical mold reflow-soldering equipment of this example. Moreover, drawing 2 is the side-face sectional view showing this vertical mold reflow-soldering equipment.

[0011] In these drawings, 11 and 12 are conveyors (conveyance section), and they are arranged so that it may counter mutually in the perpendicular condition, respectively. The suspension of these conveyors 11 and 12 is carried out to a roller, and the circulating conveyor belts 11a and 11b (12a, 12b) of two each constitute them. And these conveyor belts 11a, 11b, 12a, and 12b of each other are driven in this direction (this example above), and form the conveyance way of a printed circuit board 10 between a conveyor 11 and 12. Moreover, the rotational speed of conveyor belts 11a and 11b and conveyor belts 12a and 12b is synchronized mutually.

[0012] The long attaching parts 13 and 14 are constructed over the field where such conveyor belts 11a and 11b, and 12a and 12b counter. And the longitudinal section of these attaching parts 13 and 14 serves as L typeface, and both the attaching parts 13 and 14 serve as a pair, and hold the both ends of a printed circuit board 10.

[0013] Said heating unit 20 consists of the preheating sections 21 and 22 and these heating units 23 and 24, and is being fixed to a conveyor 11 and the fixed parts 31 and 32 arranged in 12 by the vertical single tier. The preheating sections 21 and 22 are the height locations same again, and these heating units 23 and 24 are arranged above the preheating sections 21 and 22 (downstream) at the three same height locations by the side of a conveyor 11 and 12. The preheating sections 21 and 22 consist of heaters 21a and 22a and fans 21b and 22b, spray about 150-degree C hot blast, and form a preheating zone.

[0014] Moreover, these heating units 23 and 24 consist of heaters 23a and 24a and fans 23b and 24b, and are considered as the almost same configuration as the preheating section. However, the heaters 23a and 24a of these heating units 23 and 24 are made in the output larger than the heaters 21a and 22a of the preheating sections 21 and 22, spray about 230-degree C hot blast, and form this heating zone.

[0015] The cooling fans (cooling section) 41 and 42 formed in the upper part (downstream) of a heating

unit 20 spray cold air on said printed circuit board 10, and form a cooling zone. Moreover, 50 is the ventilation section and ventilates by emitting outside the gas produced on the occasion of soldering, and the air which carried out the temperature rise.

[0016] Next, actuation of this vertical mold reflow-soldering equipment which consists of the above-mentioned configuration is explained. The printed circuit board 10 which carries out reflow soldering is laid from the carrying-in opening 60 of this equipment lower part by the loader which is not illustrated on a conveyor 11, the attaching part 13 located in 12 lower limits, and 14. And this printed circuit board 10 is perpendicularly conveyed by conveyors 11 and 12, and passes through the preheating zone -> book heating zone -> cooling zone which is the conveyance way of a printed circuit board 10 in order. First, in a preheating zone, the preheating sections 21 and 22 form about 150-degree C ambient atmosphere by hot blast, and carry out preheating of the printed circuit board 10. Next, in this heating zone, this heating unit forms about 230-degree C ambient atmosphere by hot blast, and carries out heating fusion of the soldering paste on a printed circuit board 10. And cold blast is sprayed, and cooling fans 41 and 42 make the soldering paste which carried out heating fusion solidify, and make reflow soldering complete in a cooling zone. Then, a printed circuit board 10 is taken out from the taking-out opening 70 to the equipment exterior by the unloader which is not illustrated in the place which passed through the cooling zone.

[0017] Since it has considered as the configuration which conveys a printed circuit board 10 perpendicularly, and is heated from the conveyance way both sides of a printed circuit board 10 according to the vertical mold reflow soldering equipment of such this example, coincidence heating of a printed circuit board 10 is attained, thereby, heating fusion of the soldering paste on a printed circuit board 10 can be carried out at coincidence, and poor mounting, such as a location gap of a surface mounted device and chip \*\*\*\*, can be prevented. Moreover, by having formed the conveyance way of a printed circuit board 10 perpendicularly, the breadth of equipment contracts and an installation tooth space becomes small.

[0018] In addition, the vertical mold reflow-soldering equipment of this invention is not limited to the above-mentioned example. For example, in the above-mentioned example, although the conveyor belt was used as a conveyor, other conveyors, for example, a chain etc., can also be used. Moreover, although the approach of carrying out heating fusion of the soldering paste on a printed circuit board 10 by hot blast was adopted in the above-mentioned example, especially this is not limited and can also use the various heating approaches, such as the approach of heating with the approach of heating with a near infrared ray or far infrared rays, or latent heat of vaporization.

[0019]

[Effect of the Invention] As mentioned above, as explained, while according to the vertical mold reflow-soldering equipment of this invention becoming possible to heat the soldering paste on a printed circuit board to coincidence and being able to prevent poor mounting, such as a location gap of a surface mounted device and chip \*\*\*\*, the installation tooth space of equipment can be made small.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the transverse-plane sectional view showing the vertical mold reflow-soldering equipment concerning the example of this invention.

[Drawing 2] It is the side-face sectional view showing this vertical mold reflow-soldering equipment.

[Drawing 3] It is the side-face sectional view showing the reflow-soldering equipment of the horizontal type concerning the conventional example.

[Description of Notations]

10 Printed Circuit Board

11 12 Conveyor (conveyance section)

11a, 11b, 12a, 12b Conveyor belt

13 14 Attaching part

20 Heating Unit

21 22 Preheating section

21a, 22a Heater

21b, 22b Fan

23 24 This heating unit

23a, 24a Heater

23b, 24b Fan

31 32 Fixed part

41 42 Cooling fan (cooling section)

50 Ventilation Section

60 Carrying-in Opening

70 Taking-Out Opening

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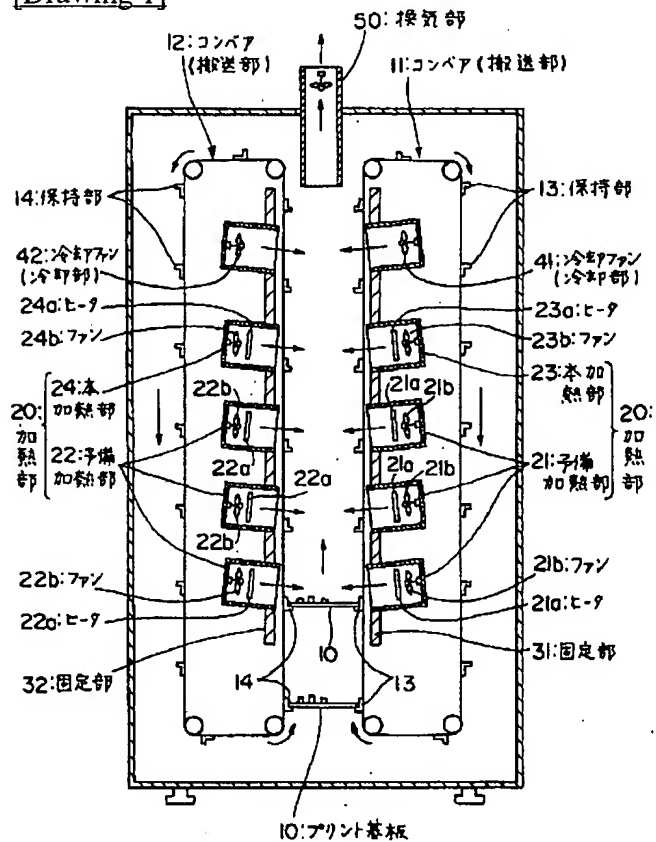
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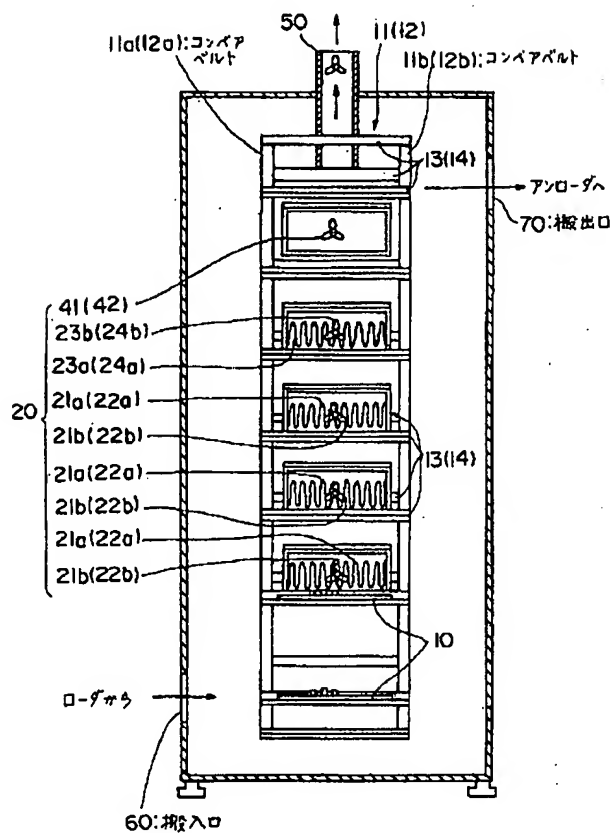
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## DRAWINGS

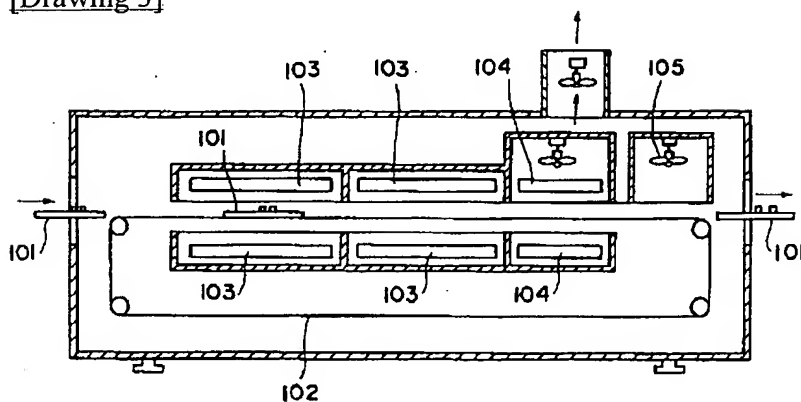
[Drawing 1]



[Drawing 2]



[Drawing 3]



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CLAIMS

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[Claim(s)]

[Claim 1] Vertical mold reflow-soldering equipment characterized by having the conveyance section which conveys perpendicularly the printed circuit board in which electronic parts were laid through soldering paste, and the heating unit which is arranged at the conveyance way both sides of this conveyance section, and carries out heating fusion of the soldering paste on a printed circuit board.

[Claim 2] Vertical mold reflow-soldering equipment according to claim 1 which consists of an attaching part to which it is arranged so that it may counter mutually in the perpendicular condition, and said conveyance section counters the conveyor driven in this direction, and these conveyors, is prepared, and holds said printed circuit board among these conveyors.

[Claim 3] Vertical mold reflow-soldering equipment according to claim 1 or 2 with which said heating unit consists of the preheating section and this heating unit.

[Claim 4] Vertical mold reflow-soldering equipment according to claim 1, 2, or 3 which equipped the downstream of said heating unit with the cooling section of a printed circuit board.

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